Chapter 4  ■ Concepts Assessment

4.1 | Roadway/Intersection Improvement Concepts

4.1A  Transportation Operational Design Criteria
4.1B  Corridor Improvement Concepts
4.1C  Intersection Improvement Concepts
4.1D  Future Traffic Operations
4.1E  Achieving Community Objectives
4.1F  Short-term Improvement Opportunities
4.1G  Improvements By Others

4.2 | Preliminary Environmental Screening
4.1 Roadway & Intersection Improvement Concepts

Evaluation & Planning

The improvement Concepts for the study roadways and intersections were identified to:
- improve the overall transportation system for all users,
- achieve the community vision for Paoli,
- work within the context of the new Paoli Intermodal Transportation Center, and
- offer a feasible solution for the existing and long-term transportation needs of the community.

Three improvement concepts were initially developed for most of the study roadways and intersections. In order to reduce impacts due to the limited right-of-way and narrower front yards along West Central Avenue, only two improvement Concepts were developed. As the study process progressed, these initial concepts were refined, and in some cases certain concepts were eliminated or added.

The transportation improvement concepts are summarized and evaluated in the following sections. It is noted that corridor improvements are referred to numerically (1, 2, 3) while intersection improvements are referred to alphabetically (A, B, C).

During the completion of this feasibility study, SEPTA was also completing a separate feasibility study for the new Paoli Intermodal Transportation Center (ITC). Three locations in Paoli were investigated and it was ultimately determined that the preferred location for the new ITC was in the location of the existing Paoli Train Station. In conjunction with the new ITC, parking garages will be constructed on the north and south sides of the rail lines. Also, Darby Road will be extended to cross over the rail lines and to intersect with N. Valley Road. The train platforms will be improved and a pedestrian bridge will be constructed. The existing N. Valley Road bridge will be demolished and the existing road bed between Lancaster Avenue and the rail lines will be lowered.

In developing the improvement Concepts, the future SEPTA Intermodal Transportation Center (ITC) was considered as part of the future conditions, including the selection of the preferred location and associated station and access improvements. Future traffic volumes and traffic patterns associated with the SEPTA ITC were also specifically evaluated in the traffic analyses. As part of the design and review process for the new ITC, design of the Lancaster Avenue/Darby Road, N. Valley Road/Darby Road intersections, the Darby Road extension and other roadways and intersections impacted by the project will be further evaluated.
The design of a roadway takes into many considerations. The two key elements in determining the design of the roadway lie in the street’s roadway classification (how it functions with respect to the overall transportation network) and the surrounding land use character. In selecting the roadway classification and land use context, and thus the design criteria, the existing characteristics of the roadway and area, as well as the community’s vision for Paoli, were considered. This section describes the design criteria utilized for the improvement Concepts for Lancaster Avenue, East Central Avenue, and West Central Avenue, as per PennDOT’s Design Manual 2.

In addition to PennDOT’s Design Manual 2, the following design guidelines for pedestrian and bicycle facilities, as well as other transportation elements, were also considered:

- *The Design and Safety of Pedestrian Facilities*, Institute of Transportation Engineers
- *Traffic Calming Handbook*, Pennsylvania Department of Transportation

The improvement Concepts were reviewed with PennDOT at two meetings to obtain the Department’s feedback on the overall design criteria, improvement concepts, and various other items. Certain elements of the design of the improvement elements have been adjusted to address the comments provided by PennDOT, and thus, the improvement Concepts have evolved slightly through the course of the study. A formal PennDOT review will be required as any improvement Concept advances to the engineering/design stage.

### 4.1A Transportation Operational Design Criteria

#### Lancaster Avenue
- **Road Classification:** Community Arterial
- **Land Use Context:** Town Center/Urban Core
- **Travel Lanes:** 10 to 12 feet
- **Parking Lane:** 7 to 8 feet
- **Bike Lane:** 5 to 6 feet
- **Curb Returns:** 15 to 40 feet
- **Total Sidewalk Width:** 12 to 22 feet
- **Clear Sidewalk Width:** 6 to 14 feet
- **Buffer Area:** 4 to 6 feet
- **Shy Distance:** 2 feet
- **Speed:** 25 to 30 mph

#### East Central Avenue and West Central Avenue
- **Road Classification:** Neighborhood Collector
- **Land Use Context:** Town Village Neighborhood
- **Travel Lanes:** 9 to 11 feet
- **Parking Lane:** 7 to 8 feet
- **Bike Lane:** 5 feet
- **Curb Returns:** 10 to 25 feet
- **Total Sidewalk Width:** 8 to 13 feet
- **Clear Sidewalk Width:** 5 to 6 feet
- **Buffer Area:** 3 to 5 feet
- **Shy Distance:** 0 to 2 feet
- **Speed:** 25 to 30 mph
4.1B Corridor Improvement Concepts

As previously noted, the three corridors evaluated by this study include:

- Lancaster Avenue (Route 30) - between Plank Avenue and Chestnut Road
- East Central Avenue - between N. Valley Road and PA Route 252
- West Central Avenue - between N. Valley Road and the Township boundary

From a design perspective, the concepts for corridor improvement were developed to address the following:

1) existing deficiencies in the transportation network for all users, as determined through traffic analyses and through conduct of the roadway safety assessment
2) the public’s concerns, issues, and overall vision for Paoli, as determined through the extensive public outreach process
3) meet current design standards or improve conditions to the greatest extent feasible and practical
4) plan for the future transportation needs of Paoli, including the new Paoli Intermodal Transportation Center (ITC) and the future Rail Yards development.

A prevalent concern of the public was making Paoli more pedestrian friendly, so development of improvements focused on setting the sidewalk as the initial design parameter and then determining the remaining elements of the roadway cross-section. Subsequent concepts add features such as on-street parking and dedicated bicycle lanes, which address other concerns raised by the community.

Synthesizing Community Input

Chapter 3 summarizes the extraordinary level of community input received for the study. As noted, there were many areas of concern, or community objectives, voiced by the public. In order to process the feedback and develop appropriate improvements, the various issues were categorized into the following (color-coded) primary focus areas:

- **Mobility and Safety Focus**
  Improve traffic flow, reduce congestion during peak hours, reduce speeding, eliminate existing deficiencies, and implement countermeasures to address crash patterns.

- **Pedestrian Focus**
  Improve walkability and pedestrian travel through the area, provide more convenient crossings of roadways, improve pedestrian crosswalks, improve conditions for all pedestrians of all abilities (i.e., handicap, elderly, children, etc.), improve conditions of sidewalks, and provide streetscape to transform the sidewalk network into a comfortable experience.

- **Parking Focus**
  Improve overall parking to support the Paoli retail district and commuters, as well as provide more convenient parking. Parking improvements were primarily considered for the Lancaster Avenue corridor.

- **Bicycle Focus**
  Improve conditions for bicycling within the Paoli area on dedicated or shared facilities; promote connectivity of bicycle routes and trails throughout the area.

- **Other Areas of Focus**
  Various other issues relative to that corridor or intersection are summarized, including stormwater, economic development and environmental sustainability.

Each of the concepts presented in this chapter attempted to address these focus areas to varying degrees. A brief summary of the how each concept satisfied the various community objectives in each focus area follow each presentation. A more detailed evaluation of each evaluation is provided later in this Study.
One of the top community objectives for Lancaster Avenue was to transform the corridor into a more pedestrian-friendly destination. Therefore, setting the preferred sidewalk dimensions for the corridor was the initial design parameter for each Concept. From this point, subsequent roadway design elements were considered including, travel lane widths, parking lanes, and bicycle lanes. Each of the Lancaster Avenue Concepts builds upon the previous Concept and increases the overall street width (as measured from back of sidewalk to back of sidewalk).

In a few cases, the recommended street width is currently limited by existing buildings, parking lots, or other property features. Since the improvement Concepts are expected to be implemented over time and in phases, there are a few ways that these constraints can be overcome and include:

1) reconfigure parking areas or features to accommodate the desirable dimensions;

2) provide a narrower sidewalk in the area as an interim improvement until such time the sidewalk can be widened (e.g. when a property redevelops);

3) require that the desired roadway and sidewalk dimensions are provided along a property frontage when it redevelops;

In additional to wider sidewalks, curb extensions are recommended for intersection corners. By extending the curb closer to the travel lane, this reduces the distance to be crossed by pedestrians and provides clear sight lines for pedestrians and motorists at intersection corners. Highly visible pedestrian crosswalks with patterned pavement markings will be provided at each key intersection in Paoli. Upgrades to the traffic signal equipment will provide pedestrian signal heads and push button activation.

The improvement Concepts for Lancaster Avenue are summarized on the following pages. More detailed conceptual layout plans of the transportation improvements are provided in Appendix E for each Concept.

**Sustainable Stormwater Management**

The principle guideline for sustainable stormwater strategies is to manage and treat stormwater at the source within the street improvements. Often, these strategies are more cost effective than traditional stormwater facilities, easier to maintain, and are landscaped to visually enhance the community. The plantings within these techniques, along with modified soils and decorative stone, act to slow, filter, and cleanse runoff while allowing infiltration of runoff. See Appendix F for Best Practices in sustainable stormwater management and green infrastructure.
4.1B Corridor Improvement Concepts

Concept 1

Concept 1 introduces wide sidewalks along the Lancaster Avenue corridor in order to make Paoli a more walkable pedestrian route which will satisfy the community’s desire to be able to walk to and around the heart of Paoli. Continuous 12-foot wide sidewalks with a eight-foot clear walking zone will support increased pedestrian traffic. Landscaped buffer (or verge) areas along the curbside will increase pedestrian comfort levels by providing a separation area between vehicular traffic, and can provide space for other amenities. Left-turn lanes and improved signal operations and technologies will improve mobility.

In addition to providing a better route to get through Paoli or to the Paoli Train Station, for example, wider sidewalks can also offer a vibrant place for the community to visit, to shop, or simply stroll. Crowded sidewalks will go far to support Paoli businesses and foster redevelopment of underutilized properties.

Other pedestrian-focused improvements will be incorporated along the corridor as well. All intersections will be modified to permit pedestrian crossings. Pedestrian signal heads are recommended for all intersections to provide clear direction for those crossing by foot. Also, pedestrian crossing of Lancaster Avenue will be more evenly spaced along the corridor between Plank Avenue and Darby Road.

In some cases, the full width of the recommended sidewalk will not be feasible until redevelopment of some properties occurs. In these cases, the sidewalk widths will narrow but not be reduced beyond the minimum of five feet. However, many segments of the sidewalk can be improved with minimal impact to properties and even support outside dining or retail display areas.

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**Exitsing Conditions**

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<thead>
<tr>
<th>South Side of the Street</th>
<th>North Side of the Street</th>
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<tr>
<td>Creates consistent 5-lane cross-section for improved traffic operations.</td>
<td>Accommodates intersection improvements and traffic signal upgrades.</td>
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<tr>
<td>Provides curb extensions at intersections.</td>
<td>Provides wide buffer with landscape, trees, amenities, and on-street parking.</td>
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<tr>
<td>Provides curb extensions at intersections.</td>
<td>New on-street parking can not be accommodated under this Concept.</td>
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<tr>
<td>With the lack of a dedicated bike lane or wide outside travel lanes, bicyclists would be best accommodated on surrounding roadways.</td>
<td>Other issues addressed: Streetscape amenities and landscaping will be provided.</td>
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<td>Green infrastructure will manage stormwater runoff.</td>
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**Concept 2**

Concept 2 builds upon all of the pedestrian-focused improvements of Concept 1 and provides on-street parking within the heart of Paoli. Available parking in Paoli was a major desire of the community. On-street parking will increase the vitality of the commercial area, create more convenient parking spaces for retail, provide greater buffers between pedestrians and autos, and result in a traffic calming effect (i.e., reduce vehicular travel speeds along the corridor).

While improvements to the Lancaster Avenue corridor under all Concepts will impact off-street parking on some properties, the provision of on-street parking could result in as many as 80 parking spaces added to the corridor. Coupled with the planned parking for the new SEPTA Train Station (approximate 600 spaces are planned, with some provided for community use) and implementation of other parking recommendations of this study, convenient parking can be provided throughout Paoli. As redevelopment occurs, there are opportunities for shared parking between land uses as well as more efficient parking configurations.

With the introduction of on-street parking along Lancaster Avenue, the sidewalk can be widened further at intersections to keep parked vehicles away from the intersection to promote better visibility for motorists and pedestrians. The wider sidewalks at intersections, also referred to as curb extensions or bulb-outs, have the added benefit of reducing pedestrian crossing distances.

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4.1B Corridor Improvement Concepts

**Concept 2**

Create wide, highly walkable sidewalks along entire corridor.

Provide wide buffer with landscape, trees, amenities, and on-street parking.

Provide curb extensions at intersections.

Add on-street parking to support businesses.

Off-street parking will be affected at some locations, however, net increase in parking is projected.

With the lack of a dedicated bike lane or wide outside travel lanes, bicyclists would be best accommodated on surrounding roadways.

Other issues addressed:
- Streetscape amenities and landscaping will be provided.
- Green infrastructure will manage stormwater runoff.

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**Other Areas of Focus**

- Mobility & Safety Focus:
  - Creates consistent 5-lane cross-section for improved traffic operations.
  - Accommodates intersection improvements and traffic signal upgrades.
  - Provide curb extensions at intersections.

- Pedestrian Focus:
  - Create wide, highly walkable sidewalks along entire corridor.
  - Provide wide buffer with landscape, trees, amenities, and on-street parking.
  - Provide curb extensions at intersections.

- Parking Focus:
  - Add on-street parking to support businesses.
  - Off-street parking will be affected at some locations, however, net increase in parking is projected.

- Bicycle Focus:
  - With the lack of a dedicated bike lane or wide outside travel lanes, bicyclists would be best accommodated on surrounding roadways.

- Other issues addressed:
  - Streetscape amenities and landscaping will be provided.
  - Green infrastructure will manage stormwater runoff.
4.1B Corridor Improvement Concepts

Concept 3

Concept 3 is the most transformative improvement scenario, which provides a truly complete street. Specifically, this Concept provides a dedicated bike lane in addition to the pedestrian-focused improvements and on-street parking featured in the prior two Concepts. A desire to be able to bike to and around Paoli, as well as provide non-vehicular travel to/from the SEPTA Train Station, was mentioned as a community desire.

A dedicated bike lane will provide a separated route along Lancaster Avenue. Although no bike lanes are currently provided in the Paoli area, future planning is underway for a connection from the Chester Valley Trail to Paoli via Cedar Hollow Road and West Central Avenue.

This Concept requires the widest cross-section to accommodate each of the improvement elements, and thus, it will have the greatest property impacts and costs.
East Central Avenue Corridor Improvement Concepts

The community concerns for East Central Avenue were summarized in Chapter 3 and the improvement Concepts were developed to address those concerns, particularly with the goal of improving pedestrian and bicycle access, reducing the speeding problem along East Central Avenue, and providing environmental sustainable stormwater management and streetscape improvements. Each of the Concepts provides various measures to calm traffic by reducing speeds and possibly deterring non-local (cut-through) traffic from using the street. The Concepts create travel lane widths that are more appropriate for a residential street with a 25 mph speed limit through physical modifications, lane restriping, or a combination of both.

To improve the safety and comfort of pedestrians, continuous facilities are provided under each Concept. Also, several raised crosswalks are recommended to prioritize the safe crossings for pedestrians and slow speeding traffic, particularly because of limited sight distance at some intersections. The raised crosswalks are needed if sidewalks are not provided along the north side of East Central Avenue.

Bicycle accommodations range from dedicated bicycle lanes, shared road facilities, and a multi-use trail along the south side of East Central Avenue.

The improvement Concepts for East Central Avenue are summarized on the following pages. More detailed conceptual layout plans of the transportation improvements within the study limits are provided in Appendix E for each Concept.

Traffic Calming
Traffic calming is defined as the combination of measures that reduce the negative effects of motor vehicle use, alter driver behavior, and improve conditions for non-motorized street users. Typically, these measures include mainly physical measures, as they are “self policing” and can influence traffic in the absence of police enforcement. See the Technical Appendix F for Best Practices in Traffic Calming.

Some traffic calming measures reduce speeds while others target a reduction in traffic volume (generally non-local, cut-through traffic) on neighborhood streets. Such reductions to speed and cut-through traffic increase the safety of the roadway for pedestrians and bicyclists, and can improve the quality of life within the community.

Gateway Treatments
Special entrance treatments, including landscaping and signage, provide identity to a community and emphasize a change in environment. Gateways are most effective when located within medians, but can be installed along the roadside.

Raised crosswalks
Raised crosswalks are marked and elevated pedestrian areas that are an extension of the sidewalk at mid-block locations or intersections. They have a similar design to a typical speed hump, but a crosswalk is provided across the flat portion of the hump, approximately 10 feet wide. These types of crosswalks should be considered at locations with high pedestrian crossing activity.

Reduced Lane Widths
Reduced vehicular travel lane widths provide a more constrained feeling for motorists through low-cost application of yellow centerlines and white edge lines, or other measures. A reduction in travel lane widths can sometimes provide added space for dedicated bike lanes. More costly physical/permanent lane width reductions are also possible.
4.1B Corridor Improvement Concepts

**Concept 1**

Within the existing cartway (curb to curb), Concept 1 provides more appropriate travel lane widths (for the roadway’s current classification of a neighborhood collector) while introducing dedicated bike lanes. The improvements will accommodate bicyclists on-road while effectively narrowing (or “right-sizing”) the now excessive roadway, which provides a traffic calming effect (i.e., slowing travel speeds). Just beyond the curb, four-foot grass buffers and a five-foot sidewalk are proposed for each side of the roadway to improve pedestrian access and walkability.

At intersections along the corridor, raised pedestrian crosswalks are also proposed for the following two reasons: 1) to slow traffic along East Central Avenue that is travelling significantly above the posted speed limit and 2) to provide safer crossings since sight distance is limited for pedestrian crossings at most intersections along this roadway segment. A small center median with gateway signing can also be provided near the PA Route 252 intersection for further traffic calming.

**Flexibility in Design**

Recognizing the impacts to the numerous properties along the north side of East Central Avenue, it would be possible to eliminate the sidewalk on this side of the avenue. If this modification is pursued, it is then recommended to provide the raised pedestrian crosswalks to move pedestrian traffic safely across East Central Avenue with only curb ramps and sidewalk landings at the crosswalks for handicap accessibility.
Like Concept 1, Concept 2 provides more appropriate travel lane widths for this neighborhood street within the existing cartway, while also introducing a dedicated on-street parking lane. This Concept increases parking within the neighborhood and near the train station, while effectively narrowing the now excessive roadway to provide a traffic calming effect (i.e., slowing travel speeds). On the south side of East Central Avenue, a wide multi-use trail would provide accommodation for pedestrians and bicyclists.

Pedestrian crosswalks and a small center median with gateway signing will also be provided for traffic calming and to provide better pedestrian crossings.

Listening to Public Feedback

When the various improvement Concepts were first presented to the public at the June 24, 2013 Open House, many participants and residents of this neighborhood expressed their dislike for on-street parking on East Central. As such, Concept 2 was dropped since other more-popular elements of this improvement scenario are included in other Concepts.

- Excessively wide lanes are reduced for traffic calming while maintaining capacity.
- Pedestrian crosswalks will serve as a traffic calming measure and provide safer pedestrian crosswalks.
- Create a multi-use trail on the south side of the street to accommodate pedestrians.
- Provide buffers with landscaping, street lighting, and possibly street trees.
- On-street parking is proposed along one side of the road. The designated side for on-street parking can alternate between intersections.
- The multi-use trail will accommodate most bicyclists while more advanced riders can still travel in the street.
- The trail can provide a connection for bicyclists to West Central Avenue, Cedar Hollow Road and ultimately the Chester Valley Trail.
- Other issues addressed: Streetscape amenities and landscaping will be provided.
- Green infrastructure will manage stormwater runoff.
4.1B Corridor Improvement Concepts

Concept 3

The Concept 3 cross-section is very similar to Concept 1 in terms of the elements provided (narrower lane widths, bike lanes, sidewalk, and buffers). However, the difference between the two Concepts is how the improvements are provided. With Concept 3, the existing northern curbline is held and the improvements, including sidewalk, are constructed south of the existing northern curbline in order to reduce impacts to the numerous residential properties along this side of the street.

Pedestrian crosswalks and a small center median with gateway signing will also be provided for traffic calming and to provide better pedestrian crossings.

Other issues addressed:
- Streetscape amenities and landscaping will be provided.
- Green infrastructure will manage stormwater runoff.
Concept 4

Concept 4 is a variation of prior Concepts and provides improved pedestrian accommodations, bicycle accommodations and traffic calming elements. In order to limit property impacts on the north side of the street, Concept 4 improvements begin south of the existing curbline including a sidewalk and buffer on the north side of the street. The overall street cartway width (curb to curb) is reduced to provide lane widths more appropriate for a neighborhood street. Also, a wide multi-use trail will accommodate bicyclists and pedestrians along the south side of the street.

Pedestrian crosswalks and a small center median with gateway signing will also be provided for traffic calming and to provide better pedestrian crossings.

Flexibility in Design
Recognizing the impacts to the numerous properties along the north side of East Central Avenue, it would be possible to eliminate the sidewalk on this side of the avenue. If this modification is pursued, it is then recommended to provide the raised pedestrian crosswalks to move pedestrian traffic safely across East Central Avenue with only curb ramps and sidewalk landings at the crosswalks for handicap accessibility.

Excessively wide lanes are reduced for traffic calming while maintaining capacity. Pedestrian crosswalks will serve as a traffic calming measure and provide safer pedestrian crosswalks.

On-street parking is not proposed as part of this Concept. Parking or temporarily standing within designated bike lanes is not permitted.

The multi-use trail will accommodate most bicyclists while more advanced riders can still travel in the street. The trail can provide a connection for bicyclists to West Central Avenue, Cedar Hollow Road and ultimately the Chester Valley Trail.

Other issues addressed:
- Streetscape amenities and landscaping will be provided.
- Green infrastructure will manage stormwater runoff.

Mobility & Safety Focus
Create a multi-use trail on the south side of the street for pedestrians. Provide buffers with landscaping, street lighting, and possibly street trees. Provide a sidewalk on the north side of the street for pedestrians.

Parking Focus
The multi-use trail will accommodate most bicyclists while more advanced riders can still travel in the street. The trail can provide a connection for bicyclists to West Central Avenue, Cedar Hollow Road and ultimately the Chester Valley Trail.

Other Areas of Focus
- Excessively wide lanes are reduced for traffic calming while maintaining capacity.
- Pedestrian crosswalks will serve as a traffic calming measure and provide safer pedestrian crosswalks.
- On-street parking is not proposed as part of this Concept. Parking or temporarily standing within designated bike lanes is not permitted.
- The multi-use trail will accommodate most bicyclists while more advanced riders can still travel in the street. The trail can provide a connection for bicyclists to West Central Avenue, Cedar Hollow Road and ultimately the Chester Valley Trail.
4.1B Corridor Improvement Concepts

West Central Avenue Corridor Improvement Concepts

Compared to East Central Avenue, the opportunities for improvements to West Central Avenue are more limited due to the existing narrower right-of-way and road width, as well as limited building setbacks. Nevertheless, two improvement Concepts were developed to 1) better accommodate non-vehicular traffic and 2) calm or slow traffic on the neighborhood street, which carries a significant amount of non-local commuter traffic.

It is also noted that West Central Avenue is a State roadway, unlike East Central Avenue. PennDOT does not typically allow traffic calming devices with vertical deflections (i.e., raised crosswalks, speed humps, etc.). Accordingly, textured crosswalks are recommended as a traffic calming measure for West Central Avenue in lieu of raised crosswalks.

The redevelopment of the rail yards redevelopment offers an opportunity to improve the overall transportation network in the area. In order to reduce the traffic impacts of this redevelopment and address transportation area needs, the planned project should consider (or be required to) implementing the following design features related to transportation:

- Select access locations and design a “spine road” through the site to draw traffic away from West Central Avenue and through the site.
- Accommodate pedestrian and bicycle traffic with sidewalks and bike lanes or a trail.
- Connect non-vehicular traffic to the south side of the rail line using the existing service tunnel situated on the western portion of the property.

In addition to traffic calming measures, improved sidewalks are provided for both Concepts and a shoulder area will accommodate bicycle traffic under one of the Concepts.

The improvement Concepts for West Central Avenue are summarized on the following pages. More detailed conceptual layout plans of the transportation improvements within the study limits are provided in the Appendix E for each Concept.

Sustainable Stormwater Management

Strategies for East and West Central Avenue
**Concept 1**

Concept 1 widens the width of the sidewalk slightly and modifies the vehicular travel width to more appropriate standards for a neighborhood collector road. The reduced travel width is accomplished with outside edge line pavement markings to provide a four-foot shoulder area. The shoulder area can also accommodate bicyclists; however, the width is not sufficient to be designated as an official bike lane. The narrower lanes encourage slower vehicular travel speeds.

Textured crosswalks at intersections along the corridor will also provide a traffic calming effect (i.e., reduction in travel speed) and provide safer pedestrian crossings. Re-profiling of East Central Avenue may ultimately be needed near Keystone Avenue in order to smooth the vertical crest and improve sight distance.

These improvements will improve both the walk-ability and bike-ability of West Central Avenue for residents. As a bike route between the Chester Valley Trail and West Central Avenue via Cedar Hollow Road is in the planning stages, Concept 1 would provide a desirable extension to the heart of Paoli.
4.1B Corridor Improvement Concepts

Concept 2

Concept 2 provides wider sidewalk by physically narrowing the curb-to-curb street width. Similar to Concept 1, this improvement Concept provides better walk-ability and promotes slower vehicular travel speeds.

Under this Concept, bicyclists would be accommodated in the travel lane. Upon development of the Amtrak Rail Yards property, it would be desirable to provide a separate bicycle connection between Cedar Hollow Road and North Valley Road through the property.
Intersection Improvement Concepts

The primary goals of developing improvements for the Paoli area study intersections were to:

1. Efficiently manage traffic and prevent congestion
2. Accommodate pedestrians by providing convenient and safer intersections.
3. Improve the overall safety of the area intersections.

Due to the higher number of pedestrians present today in Paoli, compared to many other suburban communities, the improvement Concepts tried to balance the needs of both pedestrians and the vehicular traffic. Acceptable traffic operations were achieved for the study intersections under each of the Concepts, although some specific intersection movements may still operate with longer delays during the future weekday commuter peak hours.

Due to the roadway improvements associated with the planned Paoli Intermodal Transportation Center, including the proposed Darby Road Extension, this study did not evaluate conceptual transportation improvements for the Lancaster Avenue and Darby Road intersection, the N. Valley Road and Darby Road intersection, or the Lancaster Avenue and N. Valley Road intersection. The Paoli ITC was included in the future traffic analyses, as were the proposed transportation improvements associated with that project.

Improvement Concepts were developed for the Lancaster Avenue and Paoli Pike intersection, as well as the N. Valley Road and E./W. Central Avenue intersection. The various Concepts for each intersection are presented on the following pages.

Intersection Improvements Along the Corridor

The previously described Lancaster Avenue corridor improvement Concepts each will also provide some level of improvement to the intersections along the corridor, and include the following:

- **Curb extensions** are recommended in each Concept. Curb extensions are areas of expanded curb usually on the corners of intersections that reduce pedestrian crossing distances, improve the sight line of pedestrians, make pedestrians more visible to approaching motorists, and slow right turn traffic by reducing the curb radius.

- **Adaptive traffic control** is an upgrade to conventional traffic signal controls that rely on pre-programmed time-of-day timing plans that are more constrained in adjusting timings to meet actual demands. This relatively new technology adjusts the traffic signal timings in real-time to most effectively manage actual traffic demands and improves traffic progression while reducing congestion, fuel consumption, and travel time. Adaptive traffic control is proposed for the Lancaster Avenue corridor, and critical intersections nearby.

- **Traffic signal equipment** is recommended to be upgraded with new equipment over time. The new equipment can meet the streetscape and aesthetic vision for Paoli by providing painted or ornamental fixtures.

**Pedestrian Accommodations** are recommended at each study intersection. Highly-visible painted crosswalks, pedestrian signal heads (Walking Person/Upraised Hand) with actuation, as well as appropriate pedestrian crossing times are recommended at all signalized intersections. Within the heart of Paoli, from Plank Avenue to Darby Road, pedestrian crossings will be provided at approximate 500-ft intervals, making crossings of Lancaster Avenue more convenient for pedestrians.
4.1C Intersection Improvement Concepts

Lancaster Avenue and Paoli Pike Intersection

Today, the intersection of Lancaster Avenue and Paoli Pike offers many transportation challenges due to its atypical configuration. The many deficiencies that exist at the intersection were previously documented in Chapter 2 and include issues related to walk-ability, bike-ability, overall mobility and congestion, safety, and access management. Despite the issues, there is the ability to improve the intersection significantly, which will have major benefits to the transportation network.

Three transportation Concepts have been developed to improve the overall traffic conditions at this intersection. Concept A represents a minor reconfiguration and geometric change that provides a modest improvement. Concepts B and C offer more significant changes to the intersection and surrounding transportation network and introduce new intersections to the corridor for better management of side street traffic and more convenient pedestrian crossings.

With all three Concepts, it is recommended to relocate Greenwood Avenue opposite Paoli Pike and to extend Paoli Plaza westward to Plank Avenue to provide better traffic circulation and access management.

Pedestrian Focus

Pedestrian crossings of Lancaster Avenue are currently prohibited at this intersection, thereby creating a large gap between N. Valley Road and Plank Avenue for safe crossings, which is not conducive to a walkable environment. Moreover, the unique traffic signal phasing of this intersection never stops westbound Lancaster Avenue traffic. Despite the current crossing prohibition, many pedestrians still routinely cross at (or in the vicinity) of the Paoli Pike intersection without the benefit of a traffic signal that can stop Lancaster Avenue traffic.

Each of the transportation improvement Concepts provides a signalized pedestrian crossing of Lancaster Avenue at Paoli Pike, which is approximately the mid-point between N. Valley Road and Plank Avenue. Convenient crossing locations, which are not too far spaced, will enhance the walk-ability of the area.
Concept A

Concept A improves the functionality of the intersection and the immediate area by relocating Greenwood Avenue opposite Paoli Pike, providing a separate westbound left-turn lane, and accommodating pedestrians. The reconfigured intersection will offer the following benefits to the intersection and transportation network:

- improves vehicular access to and from Paoli Plaza and properties on the north side of Lancaster Avenue, including provision of a separate eastbound left-turn lane along Lancaster Avenue;
- provides a convenient pedestrian crossing of Lancaster Avenue where crossings are currently prohibited (but occur nevertheless);
- modifies the awkward geometry of the intersection to improve traffic flow and safety.

With the exception of the relocated Greenwood Avenue, this Concept does not represent a major geometric change to the current intersection design, as compared to the next two Concepts. The major transportation issues that will remain include providing adequate storage for the heavy westbound left-turn to Paoli Pike and intersection conflict points on the southern leg of the intersection (i.e., Paoli Pike, W. Circular Avenue, and Wawa).
4.1C Intersection Improvement Concepts

**Concept B**

Concept B realigns Paoli Pike to intersect Lancaster Avenue approximately 525 feet west of its current location while Plank Avenue is relocated approximately 100 feet east of its current location to form a new four-leg, signalized intersection. The existing Lancaster Avenue/Paoli Pike intersection will continue to be provided. Greenwood Avenue will be relocated opposite the existing Paoli Pike intersection and the intersection will be signalized and allow for pedestrian crossings; however, the westbound left-turn from Lancaster Avenue to Paoli Pike will be restricted and these movements will be accommodated at the new intersection. The existing Paoli Pike segment will remain as a stub road to provide access to local business and W. Circular Avenue, as well as it will intersection Lancaster Avenue at its current location (however, left-turn movements will be restricted).

This Concept will improve traffic congestion resulting from vehicle stacking of left-turn traffic along Lancaster Avenue between Paoli Pike and N. Valley Road by providing addition spacing (and storage) for these left-turn movements.

Extension of Paoli Plaza westward to Plank Avenue will provide improved traffic circulation and access to/from the properties along the north side of Lancaster Avenue. This in turn will improve traffic operations at the signalized intersections along the corridor.

**Mobility & Safety Focus**
- Provides intersection spacing to accommodate vehicular traffic.
- Distributes traffic to two intersections for more efficient operations.
- Accommodates left-turn traffic from Lancaster Avenue with improved turn lanes.

**Pedestrian Focus**
- Provides crosswalks and pedestrian traffic signal accommodations.
- Accommodates an improved sidewalk network.
- Provides desirable intersection spacing for pedestrian crossings.

**Bicycle Focus**
- Provides traffic signal control for bicyclists to cross the intersection.

**Other issues:**
- Improves connectivity to Paoli Plaza and Plank Avenue via relocation of Greenwood Ave and extension of Paoli Plaza.
Concept C

Concept C is very similar to Concept B with respect to the overall improvement scheme and the transportation benefits. The major difference is that Concept C will extend Plank Avenue to intersect Paoli Pike in the vicinity of Richmond Road and create a signalized, four-leg intersection at Lancaster Avenue and a four-leg unsignalized intersection along Paoli Pike. Greenwood Avenue will also be relocated and it is recommended to extend Paoli Plaza westward to Plank Avenue to improve traffic circulation in the area.

Flexibility in Design

When the various improvement Concepts were first presented to the public at the June 24, 2014 Open House, Concept C was not presented as it was developed afterwards.

Based on comments received during property owner meetings, further investigation of this Concept was developed to reduce impacts to the property just west of Matthews Ford. As a variation to this Concept, the extension of Plank Avenue could follow the property line between Matthews Ford and the adjacent property to the west. Some additional modifications will be needed to the Paoli Pike/Richmond Road intersection due to the offset intersection created. This variation of the Concept can be further evaluated during detailed engineering once this transportation project moves forward. It also represents an example of how the Concepts identified in this Study can be modified to achieve specific needs and impacted property owners on a case-by-case basis, as projects advance.

4.1C Intersection Improvement Concepts

Provides a traffic signal for traffic control and reduces congestion.
Clearance intervals will be provided with traffic signal phasing to eliminate backups and conflicts between intersections.

Pedestrian Focus

Provides crosswalks and pedestrian traffic signal accommodations.
Accommodates an improved sidewalk network.

Bicycle Focus

Provides traffic signal control for bicyclists to cross the intersection.
Can accommodate corridor improvements (Alt 3) or provide connectivity to off-corridor routes/accommodations.

Other Areas of Focus

Improves connectivity to Paoli Plaza and Plank Avenue via relocation of Greenwood Ave and extension of Paoli Plaza.
Today, the intersection of N. Valley Road and E./W. Central Avenue is another intersection with transportation challenges that are worsened by its atypical configuration. In addition to the offset alignment of East and West Central Avenues, the many deficiencies that exist at this unsignalized intersection were previously documented in Chapter 2. Other deficiencies present challenges to walkability, bikeability, overall mobility and congestion, and safety at the intersection. Despite these issues, there is the ability to improve the intersection significantly, which will have major benefits to the transportation network.

Three transportation Concepts have been developed to improve the overall traffic conditions at this intersection. Concept A represents a minor capacity and geometric change that provide a modest improvement. Concepts B and C offer more significant changes to the intersection and surrounding transportation network, as well as provide a higher degree of operating efficiency for the intersection.

4.1C Intersection Improvement Concepts

N. Valley Road and E./W. Central Ave Intersection

Very little pedestrian crossings occur at this intersection today, as the offset intersection and the lack of a sidewalk on the southeast corner of the intersection, create a barrier between pedestrian flow along East and West Central Avenues. However, some of the highest pedestrian crossings in the Paoli area occur at a mid-block crossing just south of the intersection between the SEPTA/Amtrak parking lot on the Rail Yards property and the train station.

There exists several issues with this current pedestrian crossing along N. Valley Road, including:
- the current mid-block crossing is not situated in a convenient location for pedestrians, as evidenced by many pedestrians observed to be crossing outside of the marked crosswalk.
- sight distance over the N. Valley Road bridge limits sight distance to the south of the crosswalk precluding the crosswalk from being located in a more convenient location.
- traffic congestion along N. Valley Road often spills back into the crosswalk and pedestrians need to walk between queued vehicles during weekday commuter peak hours.

Pedestrian Focus

Existing Pedestrian Crossing

Future Pedestrian network proposed with the new Intermodal Transportation Center. Improvements will provide for improved pedestrian access and crossings. Source: Gannet Fleming and SEPTA.
Concept A

Concept A signals the two offset intersections at their current locations. Widening for separate left-turn lanes on each approach, as well as a separate right-turn lane on N. Valley Road, would be provided. The traffic signals would be coordinated and function as one intersection. Pedestrian crosswalks and signal equipment will be provided to improve pedestrian at the intersection.

Although the intersection operation will be improved, the offset alignment will still cause inefficiencies (and delays) to remain for some movements during the peak hours. For example, the side street approaches (i.e., E./W. Central Avenues) will require their own green phases and cannot run concurrently, thus requiring other movements to have longer stopped (red) phases.

This signalized intersection would be coordinated with the adjacent new signalized at the Darby Road/N. Valley Road intersection and potentially the Lancaster Avenue/Darby Road intersection. Adaptive traffic control could also be provided at these intersection to manage traffic flow at the N. Valley Road intersections in the study area.

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4.1C Intersection Improvement Concepts

- **Concept A**
  - Provides a traffic signal for traffic control and reduces congestion.
  - Clearance intervals will be provided with appropriate traffic signal phasing to eliminate backups and conflicts between the two Central Avenue intersections.
  - Provides crosswalks and pedestrian traffic signal accommodations.
  - Accommodates an improved sidewalk network.
  - Provides traffic signal control for bicyclists to cross the intersection.
  - Other issues:
    - The spine road within the redeveloped Rail Yards property should be designed with convenient access to the Darby Road extension and Cedar Hollow Road in order to reduce traffic through this intersection as to achieve projected operating conditions.
4.1C Intersection Improvement Concepts

**Concept B**

Concept B realigns the East and West Central Avenue approaches to create a four-leg intersection that will be signalized. Similar to Concept A, widening for separate left-turn lanes on each approach, as well as a separate northbound right-turn lane on N. Valley Road, will be provided.

It is noted that the realignment will create additional property impacts beyond those needed for the prior Concept. However, with the realignment, the intersection will function more efficiently compared to Concept A by allowing West and East Central Avenue to function on the same green phase of the traffic signal. These efficiencies will lead to shorter delays and vehicular queuing (stacking). Due to the curved alignment of these roadways, however, left-turn movements may require a protected-only left-turn advance phase.

As under Concept A, this signalized intersection will likely be coordinated with the adjacent new traffic signal at the Darby Road/N. Valley Road intersection and potentially the Lancaster Avenue/Darby Road intersection. Adaptive traffic control could also be provided at these intersection to manage traffic flow at the N. Valley Road intersections in the study area.

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**Mobility & Safety Focus**

- Provides a traffic signal for traffic control and reduces congestion.
- Provides better alignment for safety and operational improvement.
- Add turning lanes for better intersection capacity.

**Pedestrian Focus**

- Provides crosswalks and pedestrian traffic signal accommodations.
- Reduces number of street crossings.
- Accommodates an improved sidewalk network.

**Bicycle Focus**

- Provides traffic signal control for bicyclists to cross the intersection.
- Reduces number of street crossings.
- Reduces the size of the intersection and time spent within the intersection by bicyclists.

**Other Focus Areas**

- Other issues:
  - The spine road within the redeveloped Rail Yards property should be designed with convenient access to the Darby Road extension and Cedar Hollow Road in order to reduce traffic through this intersection as to achieve projected operating conditions.
Concept C

Concept C reconfigures the intersection to provide a roundabout for traffic control. All traffic approaching the roundabout is required to yield to traffic within the roundabout. The intersection will be designed in such a way as to slow traffic through the intersection. This slowing of traffic along with pedestrian refuge areas within the crosswalks offers a safer intersection configuration for pedestrians and vehicles, as compared to standard four-leg intersections.

The roundabout does require the most right-of-way of the three improvement Concepts; however, it is anticipated that this intersection control would provide the most efficient traffic operations for this intersection.

Key Benefits of Modern Roundabouts

According to the Federal Highway Administration (FHWA), modern roundabouts:

- have eight vehicle conflict points (i.e., points of impact) compared to 32 conflict points for a four-leg intersection. Also, the roundabout eliminates all crossing conflicts.
- have eight vehicle-pedestrian conflict points compared to 16 conflict points for a four-leg intersection.
- experience less severe collisions due to reduced conflict points and slower speeds as compared to four-leg intersections.


4.1C Intersection Improvement Concepts

Concept C

Provides traffic efficient traffic control.
Reduces travel speeds.
Reduces severity of collisions.
 Provides crosswalks with pedestrian refuge areas that allow pedestrians to cross one lane at a time.
Reduces vehicular travel speeds which benefits pedestrian safety.
Reduces crossing distances.
 Bicyclists can navigate within roundabout as a vehicle would or dismount and cross as a pedestrian.
Reduces vehicular travel speeds benefits bicycle safety.
Other issues:
The spine road within the redeveloped Rail Yards property should be designed with convenient access to the Darby Road extension and Cedar Hollow Road in order to reduce traffic through this intersection as to achieve projected operating conditions.

Tredyffrin Township

Chapter 4  Concepts Assessment
4.1D Future Traffic Operations

**Future Vehicular Traffic Operations**

The mobility of the transportation network in Paoli is one of several key metrics in determining the benefits of an improvement Concept. The various Concepts were developed to achieve an acceptable level of operation or service for each intersection and the corridor. Accordingly, each of the Concepts will represent an improvement to the future conditions (without any roadway or intersection modifications). Depending on the scope of improvements, there will be some variations to the operations of the corridor, intersections, and individual movements at intersections. Due to various constraints, some individual movements may still function with undesirable delay in the future peak hours, however, these delays will generally not translate to congestion problems for the overall network.

Although future traffic operations are highlighted here, there are many other important factors that were evaluated for each Concept.

The evaluation and comparison of Concepts is summarized in Chapter 7 of this study. In addition, detailed future traffic volumes and traffic operations are presented in Appendix F, along with traffic analysis worksheets.

### Future Vehicular Traffic Operations

#### Future Traffic Projections

- **2038**: The planning horizon year for this study, 20 years after completion of the Paoli ITC.
- **0.52%**: The annual regional traffic growth (per year) rate based on historic trends in Paoli.
- **769**: The number of new trips associated with the ITC and redevelopment of the Amtrak Rail Yards during the weekday morning commuter peak hour.
- **565**: The number of new trips associated with the ITC and redevelopment of the Amtrak Rail Yards during the weekday afternoon commuter peak hour.
- **20%**: The effective traffic growth estimated along Lancaster Avenue.
- **30%**: The effective traffic growth estimated along E. Central Avenue.
- **41%**: The effective traffic growth estimated along W. Central Avenue.
- **50%**: The estimated diversion of traffic through the new Rail Yards development from W. Central Avenue.
- **25%**: The estimated diversion of Darby Road traffic to the planned extension that will no longer be required to use Lancaster Avenue in the AM peak hour.

#### Future Traffic Projections

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2038</td>
<td>The planning horizon year for this study, 20 years after completion of the Paoli ITC.</td>
</tr>
<tr>
<td>0.52%</td>
<td>The annual regional traffic growth (per year) rate based on historic trends in Paoli.</td>
</tr>
<tr>
<td>769</td>
<td>The number of new trips associated with the ITC and redevelopment of the Amtrak Rail Yards during the weekday morning commuter peak hour.</td>
</tr>
<tr>
<td>565</td>
<td>The number of new trips associated with the ITC and redevelopment of the Amtrak Rail Yards during the weekday afternoon commuter peak hour.</td>
</tr>
<tr>
<td>20%</td>
<td>The effective traffic growth estimated along Lancaster Avenue.</td>
</tr>
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<td>The effective traffic growth estimated along E. Central Avenue.</td>
</tr>
<tr>
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<td>The effective traffic growth estimated along W. Central Avenue.</td>
</tr>
<tr>
<td>50%</td>
<td>The estimated diversion of traffic through the new Rail Yards development from W. Central Avenue.</td>
</tr>
<tr>
<td>25%</td>
<td>The estimated diversion of Darby Road traffic to the planned extension that will no longer be required to use Lancaster Avenue in the AM peak hour.</td>
</tr>
</tbody>
</table>
Future Pedestrian Traffic Operations

Future pedestrian traffic will be accommodated effectively by the various transportation improvement Concepts. Pedestrian-focused improvements were another key element for each improvement concept for both the corridors and intersections.

Corridor Improvements

For the various corridor improvements, the recommended sidewalk widths are sufficient to support the anticipated pedestrian traffic. Along Lancaster Avenue, the sidewalk will be comprised of a six-foot wide clear walking zone, plus a two-foot wide shy zone along the building front and, a four-foot buffer area. Within the buffer area, a landscaped (grass) or hardscaped (pavers) area will separate the clear walking zone from the edge of the sidewalk and can also accommodate street trees and street furniture which will add to the feeling of separation from the roadway for pedestrians. Off-street parking, which is recommended for all of the Lancaster Avenue corridor Concepts will also provide buffering.

Along East Central Avenue, the Concepts provide various pedestrian accommodations that include sidewalks and trails, as well as raised pedestrian crosswalks to more safely cross pedestrians from the residential neighborhood on the north side of East Central Avenue to the south side of the street. Four-foot wide landscaped (grass and street trees) buffers and/or dedicated bike lanes will separate pedestrians from the travel way.

Along West Central Avenue, the existing sidewalks will be upgraded and widened from four-feet wide to five-feet wide (a requirement of the American with Disabilities Act) and four-foot wide landscaped (grass and street trees) buffers will be provided. Painted or textured crosswalks will be provided at intersections along the corridor to prioritize pedestrian crossings, as permitted by PennDOT.

Intersection Improvements

The projected pedestrian crossing volumes and appropriate pedestrian crossing times have been included in the traffic analyses of the various improvement Concepts. As previously mentioned, the intersection improvements will also feature a variety of curb extensions (reduced crossing widths), pedestrian signal heads and activation, and high visibility crosswalks, as appropriate.

Future Pedestrian Projections

Pedestrian traffic growth in Paoli will be dependent upon several factors including:

1) the implementation of the recommended pedestrian improvements;
2) the location and intensity of future (re-)development;
3) the land use mix within the area; and
4) the availability and location of parking.

In order to provide a conservative evaluation of future pedestrian operations and needs, all existing pedestrian traffic volumes were doubled at intersections and sidewalk segments. Where new pedestrian crossings are recommended, traffic volumes were projected based on adjacent intersection activity.
4.1E Achieving Community Objectives

The community objectives were developed based on the feedback received from the public during the preliminary phases of the community engagement process. Based on the number of issues identified and visioning exercises, as highlighted in Chapter 3, the objectives were divided into the following categories:

- Walkability
- Bikeability
- Mobility
- Access Management
- Traffic Calming
- Parking
- Streetscape

Access Management and Parking criteria were objectives that related to the Lancaster Avenue corridor.

The following tables highlight how each of the improvement concepts achieved the community’s goals based on the team’s preliminary evaluation. These results were presented to the public at the 3rd Open House, while similar tables were presented during the 2nd Open House when the preliminary improvement concepts were first being presented to the community.

### Achieving Community Objectives

#### Lancaster Avenue

<table>
<thead>
<tr>
<th>Objective</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td><strong>Walk-ability</strong></td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Bike-ability</strong></td>
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<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Mobility</strong></td>
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<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Access Management</strong></td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Traffic Calming</strong></td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Parking</strong></td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Streetscape</strong></td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

#### East Central Avenue

<table>
<thead>
<tr>
<th>Objective</th>
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<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Walk-ability</strong></td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Bike-ability</strong></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Traffic Calming</strong></td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Mobility</strong></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Streetscape</strong></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

---

**Legend**

- ✓: High satisfaction of objective
- ✓: Moderate satisfaction of objective
- x: No satisfaction of objective
### 4.1E Achieving Community Objectives

#### Achieving Community Objectives

**West Central Avenue**

<table>
<thead>
<tr>
<th>Objective</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Walk-ability</strong> Improve pedestrian accommodations for safety, comfort and connectivity.</td>
<td>![Checkmark]</td>
<td>![Checkmark]</td>
<td>![Checkmark]</td>
</tr>
<tr>
<td><strong>Bike-ability</strong> Improve/provide accommodations for bicyclists.</td>
<td>![Checkmark]</td>
<td>![Checkmark]</td>
<td>![Checkmark]</td>
</tr>
<tr>
<td><strong>Mobility</strong> Improve traffic flow. Reduce travel times.</td>
<td>![Checkmark]</td>
<td>![Checkmark]</td>
<td>![Checkmark]</td>
</tr>
<tr>
<td><strong>Streetscape</strong> Improve aesthetic quality with street and sidewalk elements/landscaping.</td>
<td>![Checkmark]</td>
<td>![Checkmark]</td>
<td>![Checkmark]</td>
</tr>
</tbody>
</table>

**Legend**

- ![X] No satisfaction of objective
- ![Checkmark] Low-Moderate satisfaction of objective
- ![Double Checkmark] High satisfaction of objective

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#### Achieving Community Objectives

**Lancaster Avenue & Paoli Pike/Plank Ave Intersection**

<table>
<thead>
<tr>
<th>Objective</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Walk-ability</strong> Improve pedestrian accommodations for safety, comfort and connectivity.</td>
<td>![Checkmark]</td>
<td>![Checkmark]</td>
<td>![Checkmark]</td>
</tr>
<tr>
<td><strong>Bike-ability</strong> Improve/provide accommodations for bicyclists.</td>
<td>![Checkmark]</td>
<td>![Checkmark]</td>
<td>![Checkmark]</td>
</tr>
<tr>
<td><strong>Mobility</strong> Improve traffic flow. Reduce travel times.</td>
<td>![Checkmark]</td>
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</tr>
</tbody>
</table>

**Legend**

- ![X] No satisfaction of objective
- ![Checkmark] Low-Moderate satisfaction of objective
- ![Double Checkmark] High satisfaction of objective

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#### Achieving Community Objectives

**North Valley Road & E/W Central Avenues**

<table>
<thead>
<tr>
<th>Objective</th>
<th>A</th>
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<td>![Checkmark]</td>
<td>![Checkmark]</td>
</tr>
<tr>
<td><strong>Mobility</strong> Improve traffic flow. Reduce travel times.</td>
<td>![Checkmark]</td>
<td>![Checkmark]</td>
<td>![Checkmark]</td>
</tr>
</tbody>
</table>

**Legend**

- ![X] No satisfaction of objective
- ![Checkmark] Low-Moderate satisfaction of objective
- ![Double Checkmark] High satisfaction of objective
4.1F Short-term Improvement Opportunities

The improvement Concepts presented in this Chapter were developed to meet the long-term transportation needs of the area and achieve the community’s vision for Paoli. It will take time and significant resources to complete these transportation projects, and therefore, it is expected that improvements will be made as part of numerous projects over the course of the next twenty or so years.

The Township may choose to champion some projects individually, while it may seek to have other projects listed on the long range transportation improvement plans for the State, Chester County, and the Delaware Valley Regional Planning Commission. Still, other projects may need to be completed by development (and redevelopment) projects in order to mitigate new traffic. Chapter 7 includes an implementation and action plan section describing how the Township could advance various transportation improvements recommended by this Study. However, there are various projects that the Township is currently pursuing or should consider pursuing, in the short-term and they are shown below.

Adaptive Traffic Control

Tredyffrin Township successfully sought funding for the installation of adaptive traffic control along the Lancaster Avenue corridor under PennDOT’s Automated Red Light Enforcement (ARLE) grant program. The grant will provide approximately $565,000 from PennDOT toward the upgrade of traffic signal equipment with this new technology along the corridor. This improvement will provide significant operational benefits to the corridor today, while not precluding any of the future transportation improvements recommended for the corridor.

Pedestrian-Focused Improvements

The Township may also prioritize low-cost pedestrian improvements in Paoli, such as high visibility painted crosswalks, pedestrian signal equipment, and handicap curb ramps. It is noted that the Township is seeking grant funding for a multi-use trail along the south side of East Central Avenue and raised pedestrian crosswalks to provide safe crossings for the residential community on the north side of East Central Avenue. These improvements represent some of the elements of the previously-described Concept 4 for East Central Avenue.

Bicycle-Focused Improvements

The Township can also prioritize improving accommodations for bicyclist in the short-term, particularly along East and West Central Avenue. Pavement re-striping, a relatively low cost improvement, can achieve a dedicated five-foot wide bike lane along East Central Avenue and still provide adequately wide travel lanes. The bike lane could also reduce the excessive width of the roadway and help with traffic calming (i.e., reducing speeding). The bike lanes would likely serve more advanced bicyclists while the multi-use trail would serve children and less-advanced riders. Along West Central Avenue, which is more constrained in terms of available road width, a four-foot wide shoulder can be provided with edgeline striping. At the request of Tredyffrin Township, PennDOT recently provided these lane markings in conjunction with another of its projects. This re-striping provides adequate travel lane widths and shoulders appropriate for this type of roadway and may also reduce travel speeds. Since five-feet is the minimum required width of a dedicated bike lane, the shoulders could not be designated as such. However, the shoulder would provide a buffer between the bicyclist and the travel lane. Providing or requiring secure bike parking can also be accomplished in the near term.

Right-of-Way

The Township should coordinate with property owners and developers to obtain the adequate right-of-way to provide the recommended transportation improvements. In the case of new development, dedication of right-of-way can be a requirement of land development approval.

Traffic Calming and Education

Several lower cost traffic calming measures like portable speed carts or sign-mounted speeding signs can be used to target excessive travel speeds at problematic locations. Educational campaigns using newsletters, emails blasts, and pamphlets can also be used to promote responsible and safe driving, riding, and walking behavior.
Construction of the new Paoli Intermodal Transportation Center (ITC) and the redevelopment of the Amtrak Rail Yards property are anticipated, and therefore, have been specifically evaluated in the Study. In addition to these projects, transportation improvements to the surrounding roadway will be needed and required in order to accommodate development-generated traffic. Certain transportation improvements are anticipated with these projects, while some additional improvements may be identified upon completion of traffic impact studies that will be completed for each of these projects.

As other development and redevelopment projects occur within Paoli, they too will be required to provide transportation improvements depending on the scope of the project. In some cases, these projects may provide some elements of the improvements identified by this study. Again, traffic impact studies completed for these projects will dictate the scope of transportation improvements needed.

The Paoli Intermodal Transportation Center

The planning for the new Paoli ITC includes several transportation improvements including a new extension of Darby Road from Lancaster Avenue to N. Valley Road; removal of the existing N. Valley Road bridge; frontage and sidewalk improvements; lowering the profile (grade) of N. Valley Road between Lancaster Avenue and the rail lines; improvements to adjacent intersections.

Other transportation and non-transportation related improvements will be provided in conjunction with the new station and some elements may be constructed in phases.

The Rail Yards Development

The preliminary planning for the development of the Rail Yards project includes a mixed-use plan that includes primarily a mix of office space and residential units, with a small amount of accessory retail space. No specific transportation improvements have been identified as part of the development project at this time. However, several transportation improvement recommendations should be considered as this project moves forward and include:

- Construction of a spine road that serves the future development as well commuter (non-local traffic) in order to draw non-local traffic off of West Central Avenue.
- Provide improvements to the adjacent roadway network to mitigate site-generated traffic and advance the recommendations of this Paoli Study. Specifically, the intersection improvements to N. Valley Road and E./W. Central Avenue intersection should be provided, if they have not already been constructed.
- Provide a transportation connection at the western portion of the site to link the north and south sides of the rail lines with the existing underpass (see Section 5.2). A feasibility study should be completed to determine if vehicular access can be accommodated or if the connection can only serve pedestrian and bicycle traffic.
- Due to the proximity to the ITC, pedestrian connections and accommodations should be provided and improved as needed at the time of construction.
4.2 Preliminary Environmental Screening

Potential Environmental Impacts
Development of solutions for the improvement locations will require further evaluation and consideration of environmental issues. As part of the scope for this Study, a preliminary environmental screening was completed, and a PennDOT Level 2 Screening form has been completed and is provided in Appendix C. Based on known environmental features from a review of existing secondary data sources, potential environmental impacts exist to hazardous/residual waste sites, Section 4(f) resources, historic properties, and archaeological resources with the proposed improvements and additional right-of-way requirements. There also is expected to be a minor short-term inconvenience during construction of these potential projects. Both potential projects are located around the Paoli Train Station, which is a congested area; however, the impacts to any potential environmental resources are expected to be minor. Overall, the potential projects have received a positive reception with the public and will improve traffic operations, safety, connectivity and accessibility of Paoli.

North Valley Road and E./W. Central Avenue Intersection
The potential environmental impacts for the three concepts for the Central Avenue and North Valley Road intersection problem area were compared. The cultural and historic resources, watershed boundary, waste sites, environmental justice communities, and section 4(f) resources remained consistent for each of the concepts, with waste sites, environmental justice communities, and section 4(f) resources showing no impacts. The potential displacement/property acquisition for Concept A would be minimal for sidewalks, alteration of the existing intersection, and shifting Greenwood Avenue to the east. Property acquisitions include a paved lot on Matthews Paoli Ford adjacent to the current intersection of Lancaster Avenue and Paoli Pike and the parking lot for Bryn Mawr Trust Company.

The potential displacement/property acquisition for Concept B would be more substantial. The potential displacement/property acquisition for Concept C would be for sidewalks, modifications to Paoli Pike, shifting Greenwood Avenue to the east, and shifting Plank Avenue to the east. Concept B potential displacement/property acquisition would consist of the following: Property acquisition of the corner of a paved lot for Matthews Paoli Ford, adjacent to the current intersection of Lancaster Avenue and Paoli Pike; Property acquisition of a paved lot of Matthews Paoli Ford west of current intersection of Lancaster Avenue and Paoli Pike; Property acquisition of a parking lot for Main Line Insurance Co./Dental Office west of the current intersection of Lancaster Avenue and Paoli Pike; Property acquisition of a parking lot for a Burger King north of Lancaster Avenue; Modification of the primary entry way to a Wawa convenience store, located just east of the current intersection of Lancaster Avenue and Paoli Pike; Property acquisition of the parking lot for Bryn Mawr Trust Company; and the property acquisition of parking area of Kim's Nails Salon & Spa located just south of the current Lancaster Ave and Paoli Pike intersection.

Lancaster Avenue and Paoli Pike Intersection
The potential environmental impacts for the three concepts for the Lancaster Avenue and Paoli Pike intersection problem area were compared. The cultural and historic resources, watershed boundary, waste sites, environmental justice communities, and section 4(f) resources remained consistent for each of the concepts, with waste sites, environmental justice communities, and section 4(f) resources showing no impacts. The potential displacement/property acquisition due to a modification which would bring the roadways into a four way signalized intersection. Concept B would also require small property acquisition for sidewalks and turning lanes. Concept C would require larger property acquisitions due to a modification that would change the current intersection into a roundabout and sidewalks. Property acquisitions for Concept C would include portions of the grass lawn areas in Concept B, as well as part of the parking lot for an apartment complex southeast of the current intersection.

The potential displacement/property acquisition for Concept B and C would be more substantial. The potential displacement/property acquisition for Concepts B and C would be minimal for sidewalks, modification of Paoli Pike, shifting Greenwood Avenue to the east, and shifting Plank Avenue to the east. Concept C potential displacement/property acquisition would consist of the following: Property acquisition of the corner of a paved lot for Matthews Paoli Ford, adjacent to the current intersection of Lancaster Avenue and Paoli Pike; Potential displacement of Main Line Insurance Co./Dental Office located west of the current intersection of Lancaster Avenue and Paoli Pike; Potential displacement of a Matthews Paoli Ford building located west of the current intersection of Lancaster Avenue and Paoli Pike; Modification of the primary entry way to a Wawa convenience store, located just east of the current intersection of Lancaster Avenue and Paoli Pike; Property
acquisition of the parking lot for Bryn Mawr Trust Company; and the property acquisition of parking area of Kim’s Nails Salon & Spa located just south of the current Lancaster Ave and Paoli Pike intersection.

4.2 Preliminary Environmental Screening